



# International Journal of Intellectual Disability

E-ISSN: 2710-3897

P-ISSN: 2710-3889

IJID 2023; 4(2): 07-11

© 2021 IJSA

[www.rehabilitationjournals.com](http://www.rehabilitationjournals.com)

Received: 05-05-2023

Accepted: 09-06-2023

**Dr. Rohnika Sharma**

Associate Professor, HoD UG  
Department, MIER College of  
Education (Autonomous),  
Jammu and Kashmir, India

## Overcoming tribulations faced by children with special needs in virtual learning through ICTs

**Dr. Rohnika Sharma**

**DOI:** <https://doi.org/10.22271/27103889.2023.v4.i2a.33>

### Abstract

The present paper is based on the theme “Overcoming Tribulations Faced by Children with Special Needs in virtual learning through ICTs”. ICTs offer a great potential to support lifelong learning for all groups of students, including those who have special needs. The new digital Information and Communication Technologies (ICTs) is not single technology but combination of hardware, software, multimedia, and delivery systems. Today, ICTs in education encompasses a great range of rapidly evolving technologies. How ICTs can be used in the most effective ways for education of people with disabilities is currently high on the political agendas of all countries, particularly those who have ratified the United Nations Convention on the Rights of Person with Disabilities (CRPD, 2006). The educational needs of people with disabilities are extremely diverse. These diverse and special needs often prevent educational progress and achievement. In this context, the application of ICTs is very important as it plays an essential role in supporting high quality education for learners with disabilities. Through this paper an attempt is made to know how ICTs assist to children with special needs. It also highlights the tribulations faced by children with special needs in using ICTs, & the different curriculum websites, assistive technology, software like (Window-Eyes, JAWS, TOBII - Eye Tracking System, I - Communicator, Head-Mouse Extreme, Text Help System, Math Daisy, Zoom text, Kurzweil) available for educating children with special needs, furthermore it also reflect Accessibility and World Wide Web Consortium (W3C) Recommendations.

**Keywords:** Green computing, eco-friendly technology, carbon emissions, carbon foot print, e- waste, degradation

### Introduction

Information and communication technologies are today playing a very important role in transforming the mode of imparting education. How Information and Communication Technology (ICT) can be used in the most effective ways for education of people with disabilities is currently high on the political agendas of all countries, particularly those who have ratified the United Nations Convention on the Rights of Person with Disabilities (CRPD, 2006). A number of the general principles included in the CRPD are directly linked to UNESCO’s mandate. As the United Nations’ leading agency for education, UNESCO is at the forefront of activities aimed at promoting quality education and lifelong learning for all society members, including disabled persons.

Application of technology in the mode of imparting education is thus not only helping a lot in bridging the rural urban divide but also in improving the quality of life of excluded sections of the society. ICT to a great extent facilitates the acquisition and absorption of knowledge, and hence can provide extraordinary opportunities to developing countries for enhancing their educational systems particularly for the underprivileged constituency, and thereby for raising the level of quality of life of their people. The new communications technologies promise to reduce the sense of isolation. The educational needs of people with disabilities are extremely diverse. As with all other members of society, people with disabilities must acquire the knowledge and skills required for the community in which they live. However, they face additional demands (often referred to as special educational needs) caused by functional limitations that impact in different ways upon their ability as learners to access standard educational methods of instruction. These limitations often prevent educational progress and achievement.

In this context, the application of ICT is very important as it plays an essential role in supporting high quality education for learners with disabilities. The advantages of ICT usage

**Correspondence Author:**

**Dr. Rohnika Sharma**

Associate Professor, HoD UG  
Department, MIER College of  
Education (Autonomous),  
Jammu and Kashmir, India

in the teaching and learning process are based on the possibilities it offers for alternative means of communication, providing access to educational resources in a more convenient way and to enhancing learning motivation. By overcoming obstacles of time and space, supplementing vital human functioning and supporting the development of crucial skills, these technologies contribute to the increased effectiveness of educational processes by enabling people with disabilities to actively participate in meaningful learning experiences.

The aim of teacher education is to develop skills and appropriate knowledge among teacher trainees for using and integrating the correct technology in an appropriate manner. Every teacher should know how to use technology, pedagogy and subject area content effectively in their daily classroom teaching. It is clear that merely introducing technology to the educational process is not enough. One must ensure technological integration since technology by itself will not lead to change. Rather, it is the way in which teachers integrate technology that has the potential to bring change in the education process. Hence, attitude and self-efficacy towards technology play an important role.

In 2010 the Centre for Internet and Society (India), with the support of the Hans Foundation oversaw the publication of a print version of the online Toolkit. Other plans for the Toolkit include its continued development and improvement, its use as global repository of information on ICT accessibility for people with disabilities and its translation into a number of languages.

The new digital ICT is not single technology but combination of hardware, software, multimedia, and delivery systems. Today, ICT in education encompasses a great range of rapidly evolving technologies such as desktop, notebook, and handheld computers, digital cameras, local area networking, Bluetooth, the Internet, cloud computing, the World Wide Web, streaming, and DVDs; and applications such as word processors, spreadsheets, tutorials, simulations, email, digital libraries, computer-mediated conferencing, videoconferencing, virtual environment, simulator, emulator etc. It is important to mention that use of newer ICT is being integrated with use of older technologies, enabling the existing resources and services to be continuous use. ICT is proving very effective in delivering learning to the disabled. An illustrious example in this respect is that of Stephen Hawking, the world renowned astrophysicist, who cannot even move any of his limbs and hardly can utter some words, contributing significantly at the highest level to the world of knowledge and research. It became possible due to the ICT device developed for him to communicate his ideas to the world.

Till the recent past, the usual interface between an assistive device and an ICT system was hard wired. With the development in wireless systems, now the potential for new types of communication services which may assist different kind of disabled are emerging. For example, disabled people may communicate to applications using wireless devices for locating (for blind) and communicating with the terminals. Developments in infrared links make it feasible for a disabled user to have a hand control unit with an infrared link to the terminal.

Today ICT is being used as a tool for improving the quality of life by improved efficiency and enhanced effectiveness. Different types of ICT tools assist the people with disabilities by providing them with learning opportunities,

capabilities and also increase potential of the disabled in different walks of life. ICT makes them capable by providing the ability to access knowledge with the help of suitable digital media. ICT is playing very important role in communicating with peers, thereby promoting collaborative and social learning environment. ICT also helps disabled students in reading, writing, hearing and seeing process.

### **Tribulations faced by children with special needs in using ICT**

Due to different kind of limitations, children with special needs may not be able to use ICT applications and devices with ease, as it may be used by others. Some of the difficulties which are generally faced by different types of a disabled are:

- A physical impaired user may have difficulties in using input devices.
- A visual impaired user may have difficulties in seeing display devices.
- A hearing impaired user may have difficulties in hearing audio information.
- A person with learning/cognitive disability may have problem in understanding system operations.

To solve above mentioned problems assistive technologies are used. Assistive technologies usually refer to those products, devices or equipment's, which are used to increase or improve the functional capacities of individuals with disabilities. ICT have the potential for reducing discrimination and providing more opportunities to engage people with disabilities in all aspects of life including teaching and learning.

### **ICTs assistance to children with special needs**

#### **Assistive technology**

- **Keyboards**  
Big keyboards, multi-colored keys, key guards, non-standard.

Keyboards including one handed are all available. In addition you can have an on- screen keyboard:

- Touch screens can be used for children at an early level of development or those with physical challenges. Consider touch screens for learners who cannot manage a mouse for physical or cognitive reasons.
- Tablet devices which allow multiple touch are intuitive, fun and an increasing variety of educational applications have been developed. Consider if the ever need to learn to use a mouse because using a touch screen may delay the development of mouse skills. Examples include: Inclusive Slate, iPad, iPod Touch, Samsung Galaxy, Kindle and many other tablet devices. It is intended that personally owned devices will be able to have internet connection via the school network.
- **Alternative input:** Speech to text software e.g. Dragon Naturally Speaking, Windows 7 and Windows Vista permit text to be input by speaking into a headset. The software needs training to recognize your voice and a certain level of fluency and ability combined with persistence.
- **Speech output:** Many programs are enabled for speech feedback useful to users with Dyslexia or cognitive difficulties e.g. Text help Read and Write, Pen friend XP, Text ease, Clicker 5, Write Online, Writing with

Symbols and the Communicate series from Widget.

- Access Apps (Free) consist of over 60 open source and freeware Windows applications which run from a USB stick. The software can change screen background to reduce glare, read text aloud, adjust screen settings etc. Pupils should be able to run this software on any laptop where they have privileged user rights or on any personal computer.

ICT offers a range of specialized software and hardware solutions for communicating, accessing and inputting data/information to/from web applications. Following are some of the ICT tools/applications for assisting different kind of disabled learners:

- Specialized Keyboards, such as Braille
- Braille Printer
- Conversion of local language to Braille
- Screen Readers
- Touch Screens
- Eye Tracking
- Talking word processors
- Screen Magnifiers

#### **Various assistive technologies software**

Software used by different types of children with special needs

#### **Window-Eyes**

Window-Eyes is one of the most established and powerful screen reader tools available today? This tool gives total control over what you hear and how you hear it. It also provides enhanced Braille support. Window-Eyes provides key to opening the doors of unlimited information, to the visually impaired. Window-Eye application converts components of the Windows operating system into synthesized speech, allowing for complete and total access to Windows based computer systems to the visually impaired. Window-Eyes integrated into Windows provide seamless instant access to the operating system without having to learn a complicated set of keystrokes.

#### **JAWS**

JAWS are a powerful accessibility solution for visually impaired, that reads information on computer screen using synthesized speech. It provides many useful commands that make it easier to use programs, edit documents, and read Web pages. With a refreshable braille display, JAWS can also provide braille output in addition to, or instead of, speech. JAWS can be customized as per individual needs and preferences.

#### **TOBII eye tracking system**

TOBII Eye Tracking System is a specialized eye tracking and eye control technology. This technology makes it possible for computer to know exactly where users are looking. Tobii's eye tracking technology work on principles of advanced image processing of a person's face, by using eyes and reflections in the eyes of near-infrared reference lights to accurately estimates the 3D position in space of each eye. It finds the precise target to which each eye gaze is directed towards. It is a fully automatic eye tracking technology with high tracking accuracy and tolerance of head-motion.

#### **I Communicator**

I Communicator is an assistive tool for the people with hearing impairments? It assists in dependent communication for persons who are deaf or hard-of-hearing. It translates contents in real-time, like Speech to Text, Speech/Text to Video Sign-Language and Speech/Text to Computer Generated Voice. Content once translated can be used by the user for obtaining definitions, synonyms and antonyms, with the help of inbuilt dictionary in the system.

#### **Head-mouse extreme**

Head-mouse extreme is an innovative solution for wireless head-pointing on personal computers, Macintosh systems, and Alternative and Augmentative Communication (AAC) devices? The Head-Mouse Extreme replaces the standard computer mouse for people who cannot use or have limited use of their hands when controlling a computer or augmentative communication devices. The Head-Mouse translates natural movements of a user's head into directly proportional movements of the computer mouse pointer. The Head-Mouse has a wireless optical sensor which tracks a tiny disposable target that is conveniently placed on the user's forehead, glasses, hat, etc. It works just like a computer mouse, with the mouse pointer being moved by the motion of the users head. It is very useful for disabled suffering with arthritis, spinal cord injury as well.

#### **Math daisy**

Math Daisy is an application developed for making math accessible to the student with disabilities? It enables us to save documents in the DAISY Digital Talking Book format with accessible math. The students can use Math Player™-enabled DAISY player software to read classroom materials in the manner that suits to the disabled learners.

#### **Text help system**

Provides literacy software solutions. This software is developed to help struggling readers and writers, those with literacy difficulties, learning disabilities such as dyslexia, mild visual impairments, and also those for whom English is a second language. It helps to improve users reading, writing and research skills at school, in the workplace, and at home.

#### **Curriculum websites**

Under mention websites will help in finding and developing curriculum content for children with special needs.

- [http://snipurl.com/1xt235\(www.nicurriculum.org.uk\)](http://snipurl.com/1xt235(www.nicurriculum.org.uk))
- <http://snipurl.com/1xt2dv>
- <http://www.bbc.co.uk/school/typing>
- <http://snipurl.com/1y8eoj>
- <http://snipurl.com/1xt1pc>
- <http://www.doorwayonline.org.uk/>
- <http://snipurl.com/1xt1be>
- <http://snipurl.com/1xt1khttp://www.senteacher.org/>

Despite all the progress in the designing and development in the area of assistive technologies, the growth in technological development and use of ICT at different levels including teaching and learning, for assisting disabled still suffers from limitations.

#### **Confines in using ICT for children with special needs**

- Lack of specialized disabled friendly teacher training.

- Limited flexibility in training options for people with disability.
- Limited availability of specialized disabled friendly hardware and software resources, due to business constraints.
- Lack of formal involvement of the government organizations and support structure for ICT for the disabled.
- Attitude barriers towards people with disability.
- Lack of appropriate disabled friendly policies and their implementation.
- Limitation of finances.

### **Accessibility and World Wide Web consortium (W3C) recommendations**

Accessibility is the quality of a system that makes it easy to learn, easy to use, easy to remember, error tolerant, and subjectively pleasing. Content and tools should also be accessible, i.e. that people with disabilities should be able to use and access all the information provided for the learning experience, regardless of the type or degree of disability they suffer.

Web Accessibility Initiative (WAI) guidelines are the result of the negotiations that the World Wide Web Consortium (W3C) adopted for promoting the use of ICT for people with disabilities. These guidelines are published and broadly used guidelines for W3C Web Accessibility Initiative.

Web Content Accessibility Guidelines 2.0 (WCAG) has given wide range of recommendations for making Web content more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these web applications developed using these guidelines often make Web content more usable to users in general. Web Content Accessibility Guidelines 2.0 (WCAG) explains in detail how to make a Web site accessible for people with a variety of disabilities some of the key points of WCAG 2.0 are:

- Provide text alternatives for any non-text content
- Provide alternatives for time-based media.
- Create content that can be presented in different ways without losing information or structure.
- Make it easier for users to see and hear.
- Make all functionality available from a keyboard.
- Provide users enough time to read and use content.
- Make text content readable and understandable.
- Help users avoid and correct mistakes.
- Maximize compatibility with current and future user agents, including assistive technologies.

### **Recommendations for improvement**

Below are some recommendations which we strongly believe that, if taken care of, while suggesting, planning, using, developing tools, applications and infrastructure for people with disability, will have impact in imparting assistive teaching and learning:

- Improvement of networking facilities to allow more effective co-operation between institutions and telecentres to assist all types of disabled people using online network.
- Adaptation of standard software to the needs of learners with intellectual impairment.
- Creation of virtual environment for supporting different

types of disabled learners.

- Customization of workspace setup to fit a wheelchair.
- Development of user-friendly multiple types of user interfaces for the same device/application for facilitating different types of disabled, to increase their ability to use the services
- Making of people with disabilities as part of the decision making and planning effort alongside disability experts in projects related to disabled users
- Making tools used by disabled, to create, check and validate educational content, in such a way so that it should be accessible for teachers and system administrators with disabilities
- Providing consistency in the layout of keypads at least for blind learners
- Enabling hearing impaired person with access to audio output with proper volume control
- Advocating and supporting of more open source applications development for people with disabilities.

### **Winding up**

ICT means new digital technologies (hardware and software) and of course new hope for people with disabilities for their teaching and learning. ICTs can be a powerful tool in supporting education and inclusiveness of the people with disability. The learning resources must be developed to meet the requirements of all disabled people by overcoming the traditional barriers to mobility and geographic distance. Designers and developer of ICT applications do not have to forget usability, and must adhere to the conformance all accessibility guidelines in their applications. The application of ICTs enhances independence, integration, and equal opportunities for such people and in this way they facilitate their inclusion in society as valued, respected, and contributing members.

### **References**

1. Gibson B. Enabling an accessible web 2.0. ACM international conference proceedings of the international cross - disciplinary conference on web accessibility, 2007, 225.
2. T Lubega RB. A web design framework for improved accessibility for people with disabilities (WDFAD). ACM International Conference proceedings of the international cross disciplinary conference on web accessibility, 2008, 317.
3. The Type of Disabilities.  
<http://www.parks.ca.gov/pages/735/files/AVW-02-Types%20of%20Disabilities.pdf>, visited on 2010 Aug 04<sup>th</sup>.
4. Microsoft Accessibility Technology for Everyone Types of Assistive Technology Products.  
<http://www.microsoft.com/enable/at/types.aspx>, Last Retrieved on 18-1-2015.
5. RNIB Digital Accessibility, Assistive Technology, [http://www.tiresias.org/accessible\\_ict/at.htm#cognitive](http://www.tiresias.org/accessible_ict/at.htm#cognitive), last visited on 17-1-2015.
6. Blurton C. New Directions of ICT-Use in Education. <http://www.unesco.org/education/educprog/lwfdl/edict.pdf>; UNESCO World Communication and Information Report, 1999, Last Visited on 17-1-2015 Lasa Information Systems Team, Making Computers Accessible for Disabled People.  
<http://www.ictknowledgebase.org.uk/computeraccessibi>

- litytips, last visited on 17-1-2015
7. Ananthkrishnan MV. ICT tools for Disabled and Underprivileged.  
<http://www.i4donline.net/articles/currentarticle.asp?articleid=1809&typ=Features>, Last Visited on 17-1-2015.
  8. Jakob Nielsen's Website. Usable Information Technology, <http://www.useit.com>, Last Visited on 16-1-2015.
  9. Leporini B, Paternò F. Criteria for Usability of Accessible Web Sites, Proceedings 4<sup>th</sup> Edition User Interface for All, Springer Verlag
  10. W3C. Web Accessibility Initiative, <http://www.w3c.org/wai>, last visited on 17-1-2015.
  11. W3C. User Agent Accessibility Guidelines 2.0, <http://www.w3.org/TR/UAAG20>, last visited on 17-1-2015.
  12. GW-Micro. Window-Eyes.  
<http://www.gwmicro.com/Window-Eyes/>, last visited on 17-1-2015
  13. Freedom Scientific. JAWS.  
<http://www.freedomscientific.com/jaws-hq.asp>, last visited on 17-1-2015.
  14. Tobli Technology. TOBII eye tracking.  
[http://www.tobii.com/corporate/eye\\_tracking/our\\_technology.asp](http://www.tobii.com/corporate/eye_tracking/our_technology.asp), last visited on 17-1-2015.
  15. ICommunicator. ICommunicator.  
<http://www.icommunicator.com/productinfo/>, last visited on 16-1-2015
  16. Origin Instruments, "Head-Mouse® Extreme", <http://orin.com/access/headmouse/index.htm>, last visited on 15-1-2015
  17. Design Science. Math Daisy.  
<http://www.dessci.com/en/products/mathdaisy/default.htm>, last visited on 16-1-2015
  18. Design Science. Math Daisy.  
<http://www.dessci.com/en/support/mathdaisy/tsn/tsnmd01.htm>, last visited on 17-1-2015
  19. Text Help Systems Ltd., TextHelp System, <http://www.texthelp.com/>, visited on 17-1-2015.